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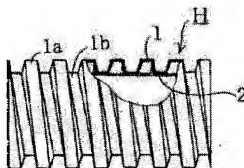
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(54) CORRUGATED PIPE MADE OF SYNTHETIC RESIN

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a synthetic resin, made duplex pipe that can prevent the occurrence of wrinkles inside an inner pipe, and has high durability and molding property.

SOLUTION: This synthetic resin made double pipe H comprises an outer pipe 1 axially and alternately having spiral crest parts 1a and troughs 2a on its outer surface and the cylindrical inner pipe 2, integrally jointed to the inner surface of respective troughs 2a of the outer pipe. The outer pipe 1 is made of rigid thermoplastic resin, and the inner pipe 2 is made of a polyolefin-based thermoplastic elastomer.



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CLAIMS

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## [Claim(s)]

[Claim 1]It is spirally annular on the outside of a tube body and this tube body, and consist of a reinforcing member provided along with shaft orientations, this reinforcing member is formed with hard synthetic resin, and a tube body is smooth in that whole or inner surface, A corrugated steel pipe made of a synthetic resin formed with thermoplastic elastomer or an ethylene system copolymer which wrinkles do not generate at the time of crookedness.

[Claim 2]The corrugated steel pipe made of a synthetic resin according to claim 1 to which it comes to form a tube body with hard synthetic resin except for the inner surface.

[Claim 3]The corrugated steel pipe made of a synthetic resin according to claim 1 or 2 whose thermoplastic elastomer is an elastomer of a polystyrene system, a polydiolefin system, a VCM/PVC system, a polyolefin system, a chlorinated polyethylene system, a polyurethane system, a polyester system, a fluorine system, or a silicone series.

[Claim 4]The corrugated steel pipe made of a synthetic resin according to claim 3 whose thermoplastic elastomer is thermoplastic elastomer of a polyolefin system.

[Claim 5]The corrugated steel pipe made of a synthetic resin according to any one of claims 1 to 4 which is the dynamic-bridge-formation thermoplastic elastomer to which thermoplastic elastomer made an inside distribute minutely a rubber composition which constructed the bridge with sulfur or a peroxide.

[Claim 6]The corrugated steel pipe made of a synthetic resin according to claim 1 or 2 whose ethylene system copolymer is an ethylene-vinyl acetate copolymer, ethylene / methyl methacrylate copolymer, or an ethylene ethyl acrylate copolymer.

[Claim 7]A corrugated steel pipe made of a synthetic resin of any one description of the Claims 1-6 which a reinforcing member is the outer tube part which equipped shaft orientations with peak parts and a trough by turns spirally or annularly, and are the inner tube parts by which a tube body was joined to an inner surface of said outer tube part by one.

[Claim 8]A corrugated steel pipe made of a synthetic resin of any one description of the Claims 1-7 set to  $R/D > 1$  when crookedness sets an inside diameter of a tube body to  $D$  (mm) and sets a crookedness value to  $R$  (mm).

[Claim 9]Claims 1-5, a corrugated steel pipe made of a synthetic resin of any one description of 7 which are set to  $R/D > 0.5$  when it was smooth and the whole tube body was formed by thermoplastic elastomer which wrinkles do not generate at the time of crookedness, and crookedness sets an inside diameter of a tube body to  $D$  (mm) and sets a crookedness value to  $R$  (mm).

[Claim 10]Claims 1-5, a corrugated steel pipe made of a synthetic resin of any one description of 7-9 to which an outer tube part is formed in with high density polyethylene, medium-density-polyethylene resin, or low density polyethylene, and it comes to form an inner tube part by thermoplastic elastomer of a polyolefin system, respectively.

[Claim 11]Claims 1-5, a corrugated steel pipe made of a synthetic resin of any one description of 7-10 to which it comes to form an inner tube part by a weight ratio with 100% - 30% of thermoplastic elastomer, and a mixture with 0% - 70% of hard synthetic resin.

[Claim 12]Claims 1-2, a corrugated steel pipe made of a synthetic resin of any one description of

6-8 to which it comes to form an inner tube part by a weight ratio with 0% - 50% of an ethylene system copolymer, and a mixture with 100% - 50% of hard synthetic resin.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]About the corrugated steel pipe made of a synthetic resin, especially in more detail, in a building, this invention is installed in the drainage pipe way in a single-family house, the outdoors, underground, etc., and relates to the corrugated steel pipe made of a synthetic resin suitable for the use as a pipeline for transportation of solids, such as a fluid, a gas and a resin pellet, garbage, dust.

[0002]

[Description of the Prior Art]The form of a pipe outer wall as a pipeline for transportation of this kind of fluid conventionally in shaft orientations on the ribbed pipe and concrete target which are unevenness. The outer tube in which the peak parts spiral on the outside or annular and trough of the cylindrical tube body were provided by turns in shaft orientations, The double pipe made of a synthetic resin which consists of a tubed inner tube joined to one, and the straight pipe made of a synthetic resin whose form of a pipe outer wall is linear shape in shaft orientations are well known for the inner surface of the trough of this outer tube, and it is already widely used as \*\* and the drainage tube, or the pipe for transportation of various substances.

[0003]

[Problem to be solved by the invention]However, since flexibility fell, what has made the inner surface of the inner tube smooth in order to improve the transportation performance of the double pipe made of a synthetic resin of these former, etc. had the problem that a pipe is crushed at the time of crookedness, or wrinkles projected inside and transport capacity declined.

[0004]So that it may be indicated by JP,S62-66084,U and JP,H10-122448,A, in order to solve this problem, Although there are some which prevented projection of the wrinkles to the inner

surface of a tubular body, and improved flexibility by twisting spirally the elasticity band form made of rubber which has a hard reinforcement wire object, and considering it as the tubular body which constituted the inner surface from an elasticity band form made of rubber at least, Since molding workability was not good since the vulcanization step for the elasticity band form made of rubber to show and appear in an inner surface, and for the problem that endurance is bad, and a rubber raw material make the characteristic as rubber revealing after extrusion from a certain thing is required, or the bridge was constructed over the chain, the problem that recycling was difficult occurred.

[0005]

[Means for solving problem]It is spirally annular on the outside of a tube body and this tube body, and consist of a reinforcing member provided along with shaft orientations, this reinforcing member is formed with hard synthetic resin, and the tube body of this invention is smooth in that whole or inner surface, The corrugated steel pipe made of a synthetic resin formed with the thermoplastic elastomer or the ethylene system copolymer which wrinkles do not generate at the time of crookedness is provided.

[0006]Namely, when this invention forms the inner surface of a tube body with thermoplastic elastomer or an ethylene system copolymer, When you make it crooked and [, for example, the inner surface of a tube body, is formed by thermoplastic elastomer, When wrinkles occur at the time of crookedness, the crookedness radius  $R$  becomes more than  $R/D > 1$  to inside diameter:25 of a tube body - 600mmD in the crookedness which is not and the whole tube body is further formed by thermoplastic elastomer, Wrinkles occur at the time of crookedness, the crookedness radius  $R$  is set to  $R/D > 0.5$  to inside diameter:25 of a tube body - 600mmD, and the crookedness which is not prevents generating of the wrinkles in an inner surface, and endurance and molding workability tend to be made good, and it is also going to make recycling efficiency good. In short, by using a specific spring material or an elasticity resin material for the inner surface of a tube body, the corrugated steel pipe made of a synthetic resin of this invention can combine occurrence prevention, and the good endurance and molding workability of wrinkles, can make them possible, and can improve recycling efficiency further.

[0007]Here, the tube body of the corrugated steel pipe made of a synthetic resin of this invention means a tube-like object with a circular cross section of the inner surface of a breakthrough at least, and a cylindrical body with both circular cross sections of the inner surface and outside surface of a tubular body is usually adopted. As thermoplastic elastomer used as a material of this tube body, A polystyrene system, a poly diolefin system, a VCM/PVC system, a polyolefin system, The elastomer of a chlorinated polyethylene system, a polyurethane system, a polyester system, a fluorine system, or a silicone series, etc. can be mentioned, and when especially an outer tube is polyolefin system resin, since welding nature

of thermoplastic elastomer olefin is the highest, it is more preferred. Use of the dynamic-bridge-formation thermoplastic elastomer which made the inside distribute minutely the rubber composition which constructed the bridge highly with sulfur or a peroxide as thermoplastic elastomer is also possible. As dynamic thermoplastic elastomer, the Saintes plain [made in Advanced Encryption Standard Japan] can specifically be mentioned. As an ethylene system copolymer used as a material of a tube body, An ethylene-vinyl acetate copolymer, ethylene / methyl methacrylate copolymer, or an ethylene ethyl acrylate copolymer can be mentioned, and when especially an outer tube is polyolefin system resin, since welding nature of an ethylene-vinyl acetate copolymer is high, it is more desirable.

[0008]On the other hand as rigid thermoplastic used as a material of a reinforcing member, high density polyethylene, medium density polyethylene, low density polyethylene, straight-chain-shape low density polyethylene, polystyrene, polyvinyl chloride, ABS plastics, etc. can be mentioned, and polyethylene resin is more preferred. The corrugated steel pipe made of a synthetic resin concerning this invention, Synthetic resin tube manufacturing for \*\*\*\* of various substances can be meant, and especially generating of the wrinkles of an inner surface can be prevented, and it can use suitably for the pipe for transportation etc. of various substances used for the good endurance, flexibility, buckling strength, etc. installing in the inside of the inside of the ground, or a building.

[0009]The corrugated steel pipe made of a synthetic resin concerning this invention is preferably taken as the double pipe made of a synthetic resin of integral construction. That is, use a reinforcing member as the outer tube part (or outer tube) which equipped shaft orientations with peak parts and a trough by turns spirally or annularly, and let a tube body be the inner tube part (or inner tube) joined to the inner surface of said outer tube part by one. It is preferred to use an outer tube part as high density polyethylene, medium density polyethylene, or low density polyethylene resin here, and to form an inner tube part by the thermoplastic elastomer of a polyolefin system, respectively. An inner tube part may be formed by a weight ratio with 100% - 30% of thermoplastic elastomer, and a mixture with 0% - 70% of hard synthetic resin. An inner tube part can be formed by a weight ratio with 0% - 50% of an ethylene system copolymer, and a mixture with 100% - 50% of hard synthetic resin.

[0010]Next, although the example of the manufacturing method of this double pipe made of a synthetic resin is explained briefly, it is not necessarily limited to this. First, forming [ wind spirally the band form in which thermoplastic elastomer carried out melting to the peripheral surface of the cylindrical rotation mandrel from the extrusion machine so that a part may be piled up, and ] an inner tube part. By supplying so that a section may furthermore be made into the letter of crookedness for the band form in which the synthetic resin (high-density-polyethylene resin or medium-density-polyethylene resin) carried out melting to the peripheral surface of the inner tube part separately and a part may be piled up, and forming an outer tube

part, The cross section of an inner surface can be used as an approximate circle form, and the corrugated steel pipe made of a synthetic resin (double pipe) which consists of an outer tube part which equipped shaft orientations with peak parts and a trough spiral on an outside surface by turns, and a cylindrical inner tube part joined to one by the inner surface of each trough of this outer tube part can be obtained (it is referring to JP,H5-72852,B for details).

[0011]Into the die provided with the outer tube part die surface which has an annular crevice and heights by turns, and the inner tube part die surface of the same path as the crevice of an outer tube part die surface, Extruding melting resin, respectively and forming the outer tube part of melting resin (high density, semi-gross density, or low density polyethylene resin) in the above-mentioned outer tube part die surface. Melting resin (thermoplastic elastomer) is extruded from an inner tube part die surface to tubed into this outer tube part, By producing differential pressure between the inside and outside, making this melting resin adhere to the trough inner surface of the above-mentioned outer tube part, carrying out thermal melting arrival, having, and making a cylindrical melting resin inner pipe part form, It cannot be spiral on the outside surface of an outer tube part, shaft orientations can be equipped with annular peak parts and trough by turns, and other composition can obtain the corrugated steel pipe [ like ] made of a synthetic resin substantially the same as an above-mentioned example (double pipe) (it is referring to JP,H2-21477,B for details). In addition, after extruding an inner tube part to tube shape, a reinforcement section agent can be twisted and it can also be considered as a double pipe.

[0012]

[Mode for carrying out the invention]Hereafter, this invention is explained based on the embodiment shown in a figure. This invention is not limited by this. drawing 1 shows one embodiment of the corrugated steel pipe made of a synthetic resin concerning this invention first -- a fracture front view and drawing 2 are the important section expanded sectional views of drawing 1 in part.

[0013]In drawing 1 - 2, the double pipe H for transportation of a waterworks. The outer tube 1 as a reinforcing member which equipped shaft orientations with the peak parts 1a and the trough 1b spiral on an outside surface continuously by turns. It consists of the cylindrical inner tube 2 as a tube body joined to one by the inner surface of the trough 1b of this outer tube, and the outer tube 1 is formed by high density or medium-density-polyethylene resin, and the inner tube 2 is formed by polyolefin system thermoplastic elastomer, respectively.

[0014]In this way, even if the double pipe H for transportation is arranged the inside of the ground, and in a joint box at a curve condition, it is high density or medium-density-polyethylene resin about the outer tube 1, Since the inner tube 2 is formed by polyolefin system thermoplastic elastomer, generating of the wrinkles in the inner surface of the inner tube 2 can be suppressed, and buckling strength, tearing strength, endurance, and recycling

efficiency are good. Of course, the polyolefin system thermoplastic elastomer of the material of the inner tube 2 is easy to process, without needing a vulcanization step like rubber materials, such as a styrene butadiene copolymer and chloroprene. If it furthermore says, as compared with rubber materials, such as a styrene butadiene copolymer, polyisoprene rubber, and crude rubber, a water resisting property, acid resistance, and alkali resistance are good, and weatherability is also good.

[0015]The material and the example of size specification of the double pipe H for transportation are given by reference here (however, a standard linear dimension: 4000 mm). Inner tube (cylindrical pipe) (what carried out micro-disperse of the ethylene propylene diene copolymer particles to the matrix of the polyolefin system, Shore hardness:60A) inside diameter: -- 49-mm outer diameter: -- a 50-mm outer tube (high-density-polyethylene resin) inside diameter (trough outer diameter): -- 51-mm outer diameter (Yamabe outer diameter): -- 60 mm, although the outer tube part was formed with hard polyethylene resin, wrinkles did not produce this above-mentioned double pipe H for transportation in the inner surface of the inner tube part in the curvature radius of about 50 mm with the elasticity of the composition and the material itself which mainly have its peak parts and trough.

[0016]Unlike an above embodiment, it is not about an outer tube on the outside of an inner tube at the shape of a spiral, and peak parts and a trough can also be annularly provided in shaft orientations by turns.

[0017]

[Effect of the Invention]According to the corrugated steel pipe made of a synthetic resin concerning this invention, a reinforcing member with rigid thermoplastic. Since wrinkles do not occur in a tube body inner surface when a corrugated steel pipe is made crooked by forming the inner surface of a tube body with the spring material which consists of thermoplastic elastomer or an ethylene system copolymer, the splicer in a bending part becomes unnecessary, and construction can be done simply, and recycling efficiency is also made good.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1]one embodiment of the corrugated steel pipe made of a synthetic resin concerning this invention is shown — it is a fracture front view in part.

[Drawing 2]It is an important section expanded sectional view of drawing 1.

[Explanations of letters or numerals]

1 Outer tube

1a Peak parts

2 Inner tube

2a Trough

H The double pipe made of a synthetic resin for transportation

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(19) 日本国特許庁 (J P)

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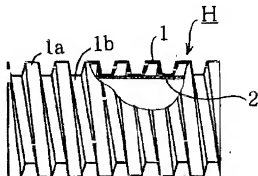
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(54) 【発明の名称】 合成樹脂製コルゲートパイプ

(57) 【要約】

【課題】 内管の内面でのしわの発生を防止できると共に良好な耐久性及び成形加工性を有する合成樹脂製二重管の提供。

【解決手段】 外面に螺旋状の山部1 aおよび谷部2 aを軸方向に交互に備えた外管1と、この外管の各谷部2 aの内面で一体に接合された円筒状の内管2とからなり、外管1が硬質熱可塑性樹脂で、内管2がポリオレフィン系熱可塑性エラストマーでそれぞれ形成されてなる合成樹脂製二重管H。



## 【特許請求の範囲】

【請求項1】 管本体と、この管本体の外側に螺旋状に又は環状で軸方向に並んで設けられた補強部材とからなり、

この補強部材が硬質合成樹脂で形成され、

管本体が、その全体又は内面を、滑らかで、屈曲時にしわが発生しない熱可塑性エラストマー又はエチレン系共重合体で形成してなる合成樹脂製コルゲートパイプ。

【請求項2】 管本体が、その内面を除いて硬質合成樹脂で形成されてなる請求項1に記載の合成樹脂製コルゲートパイプ。

【請求項3】 熱可塑性エラストマーが、ポリスチレン系、ポリオレフィン系、塩化ビニル系、ポリオレフィン系、塩素化ポリエチレン系、ポリウレタン系、ポリエステル系、フッ素系又はシリコン系のエラストマーである請求項1又は2に記載の合成樹脂製コルゲートパイプ。

【請求項4】 熱可塑性エラストマーが、ポリオレフィン系の熱可塑性エラストマーである請求項3に記載の合成樹脂製コルゲートパイプ。

【請求項5】 熱可塑性エラストマーが、硫酸や過酸化水素により架橋したゴム成分を内部に微細に分散させた動的架橋熱可塑性エラストマーである請求項1〜4のいずれかに記載の合成樹脂製コルゲートパイプ。

【請求項6】 エチレン系共重合体が、エチレン酢酸ビニル共重合体、エチレン/メタクリル酸メチル共重合体又はエチレンアクリル酸エチル共重合体である請求項1又は2に記載の合成樹脂製コルゲートパイプ。

【請求項7】 補強部材が、螺旋状に又は環状に山部および谷部を軸方向に交互に備えた外管部であり、管本体が前記外管部の内面に一体に接合された内管部である請求項1〜6のいずれか1つに記載の合成樹脂製コルゲートパイプ。

【請求項8】 屈曲が、管本体の内径を $D$  (mm)、屈曲値を $R$  (mm)とした場合、 $R/D > 1$ となる請求項1〜7のいずれか1つに記載の合成樹脂製コルゲートパイプ。

【請求項9】 管本体の全体を、滑らかで、屈曲時にしわが発生しない熱可塑性エラストマーで形成し、屈曲が、管本体の内径を $D$  (mm)、屈曲値を $R$  (mm)とした場合、 $R/D > 0.5$ となる請求項1〜5、7のいずれか1つに記載の合成樹脂製コルゲートパイプ。

【請求項10】 外管部が高密度ポリエチレンまたは中密度ポリエチレン樹脂または低密度ポリエチレンで、内管部がポリオレフィン系の熱可塑性エラストマーでそれぞれ形成されてなる請求項1〜5、7〜9のいずれか1つに記載の合成樹脂製コルゲートパイプ。

【請求項11】 内管部が、重量比で、熱可塑性エラストマー100%〜30%と、硬質合成樹脂0%〜70%との混合物で形成されてなる請求項1〜5、7〜10の

いずれか1つに記載の合成樹脂製コルゲートパイプ。

【請求項12】 内管部が、重量比で、エチレン系共重合体0%〜50%と、硬質合成樹脂100%〜50%との混合物で形成されてなる請求項1〜2、6〜8のいずれか1つに記載の合成樹脂製コルゲートパイプ。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、合成樹脂製コルゲートパイプに関し、更に詳しくは建物内、特に戸建て住宅内の排水管路、屋外、地中等に設置され、流体、気体、及び樹脂ペレットやゴミ、ホコリなどの固形物の輸送用管路としての使用に適した合成樹脂製コルゲートパイプに関するものである。

## 【0002】

【従来の技術】従来、この種の流体の輸送用管路として、管外壁の形状が軸方向に凹凸である波付管、具体的には、円筒状管本体の外側に螺旋状又は環状の山部および谷部を軸方向に交互に設けられた外管と、この外管の谷部の内面とで一体に接合された筒状の内管とからなる合成樹脂製二重管や、管外壁の形状が軸方向に直線状である合成樹脂製ストレート管がよく知られており、既に様々な物質の送・排液管あるいは輸送用管として広く使用されている。

## 【0003】

【発明が解決しようとする課題】しかしながら、これら従来の合成樹脂製二重管の輸送性能等を高める目的で内管の内面を平滑にしてあるものは、可撓性が低下するため、屈曲時に管が潰れたり、内面にしわが突出して輸送能力が低下するという課題を有していた。

【0004】また、この問題を解決する目的で、実開昭62-66084号公報や特開平10-122448号公報に開示される様に、硬質補強線を有するゴム製軟質管状体を螺旋状に巻き付けて、少なくとも内面をゴム製軟質管状体で構成した管状体とすることにより、管状体の内面へのしわの突出を防止し屈曲性を高めたものがあるが、ゴム製軟質管状体が内面にむき出しであることから耐久性が悪いといった問題や、ゴム原料は押出後にゴムとしての特性を発現させるための加硫工程が必要であるため成形加工性がよくなかったり、分子鎖が架橋されているためにリサイクルが難しいといった課題があった。

## 【0005】

【課題を解決するための手段】本発明は、管本体と、この管本体の外側に螺旋状に又は環状で軸方向に並んで設けられた補強部材とからなり、この補強部材が硬質合成樹脂で形成され、管本体が、その全体又は内面を、滑らかで、屈曲時にしわが発生しない熱可塑性エラストマー又はエチレン系共重合体で形成してなる合成樹脂製コルゲートパイプを提供する。

【0006】すなわち、本発明は、管本体の内面を熱可

塑性エラストマー又はエチレン系共重合体で形成することによって、屈曲させたときに【例えば、管本体の内面のみが熱可塑性エラストマーで形成されたとき、屈曲時にしわが発生しない屈曲が管本体の内径：25～600mmDに対し屈曲半径Rが $R/D > 1$ 以上になり、さらに管本体の全体が熱可塑性エラストマーで形成されたとき、屈曲時にしわが発生しない屈曲が管本体の内径：25～600mmDに対して屈曲半径Rが $R/D > 0.5$ になり内面でのしわの発生を防止すると共に、耐久性及び成形加工性を良好にし、かつリサイクル性も良好にしようとするものである。要するに本発明の合成樹脂製コルゲートパイプは、管本体の内面に特定の弾性材料又は軟質樹脂材料を用いることによって、しわの発生防止と、良好な耐久性及び成形加工性とを併せて可能にし、さらにリサイクル性を高めることができるわけである。

【0007】ここで、本発明の合成樹脂製コルゲートパイプの管本体は、少なくとも貫通孔の内面の横断面が円形の筒状体を意味し、通常は管状体の内面・外面の横断面が共に円形の円筒状体が採用される。この管本体の材料として用いられる熱可塑性エラストマーとしては、ポリエチレン系、ポリジオレフィン系、塩化ビニル系、ポリオレフィン系、塩素化ポリエチレン系、ポリウレタン系、ポリエステル系、フッ素系又はシリコン系のエラストマーなどを挙げることができ、特に外管がポリオレフィン系樹脂の場合には、オレフィン系熱可塑性エラストマーが、溶着性が最も高いため、より好ましい。また熱可塑性エラストマーとして、硫黄や過酸化合物により高度に架橋したゴム成分を内部に微細に分散させた動的架橋熱可塑性エラストマーの使用も可能である。更に具体的には動的熱可塑性エラストマーとしては、サントプレーン【エーエス ジャパン(株)製】を挙げることができる。管本体の材料として用いられるエチレン系共重合体としては、エチレン酢酸ビニル共重合体、エチレン/メタクリル酸メチル共重合体又はエチレンアクリル酸エチル共重合体を挙げることができ、特に外管がポリオレフィン系樹脂の場合には、エチレン酢酸ビニル共重合体が溶着性が高いため、より好ましい。

【0008】一方、補強部材の材料として用いられる硬質熱可塑性樹脂としては、高密度ポリエチレン、中密度ポリエチレン、低密度ポリエチレン、直鎖状低密度ポリエチレン、ポリスチレン、ポリ塩化ビニル、ABS樹脂などを挙げることができ、ポリエチレン樹脂がより好ましい。なお、本発明に係る合成樹脂製コルゲートパイプは、様々な物質の送排用の合成樹脂製管を意味し、特に内面のしわの発生を防止でき、かつその良好な耐久性、屈曲性、座屈強度などのために、土中や建物内部に設置して使用される様々な物質の輸送用管などに好適に利用できる。

【0009】本発明に係る合成樹脂製コルゲートパイプは、好ましくは一体構造の合成樹脂製二重管とする。す

なわち、補強部材を螺旋状に又は環状に山部および谷部を軸方向に交互に備えた外管部（又は外管）とし、管本体を前記外管部の内面に一体に接合された内管部（又は内管）とする。ここで外管部を高密度ポリエチレンまたは中密度ポリエチレンまたは低密度ポリエチレン樹脂とし、内管部をポリオレフィン系の熱可塑性エラストマーでそれぞれ形成するのが好ましい。さらに、内管部を、重量比で、熱可塑性エラストマー100%～30%と、硬質合成樹脂0%～70%との混合物で形成してもよい。また内管部を、重量比で、エチレン系共重合体0%～50%と、硬質合成樹脂100%～50%との混合物で形成できる。

【0010】次に、この合成樹脂製二重管の製造方法の例を簡単に説明するが、これに限定されるわけではない。まず、円筒状の回転マンドレルの周面に、押出機から熱可塑性エラストマーの溶融した帯状体を一部を重ね合わせるように螺旋状に捲回して内管部を形成しながら、さらにその内管部の周面に、別途合成樹脂（高密度ポリエチレン樹脂または中密度ポリエチレン樹脂）の溶融した帯状体を断面を屈曲状にして一部を重ね合わせるように供給して外管部を形成することにより、内面の横断面を略円形とし、外面に螺旋状の山部および谷部を軸方向に交互に備えた外管部と、この外管部の各谷部の内面で一体に接合された円筒状の内管部とからなる合成樹脂製コルゲートパイプ（二重管）を得ることができる（詳細は特公平572852号公報参照）。

【0011】更に環状の凹部及び凸部を交互に有する外管部成形面と、外管部成形面の凹部と同一径の内管部成形面とを備えた成形型内へ、それぞれ溶融樹脂を押し出して上記外管部成形面に溶融樹脂（高密度、中密度または低密度ポリエチレン樹脂）の外管部を形成しながら、この外管部内へ内管部成形面から溶融樹脂（熱可塑性エラストマー）を筒状に押し出し、その内外間に差圧を生じさせて、該溶融樹脂を上記外管部の谷部内面に付着させて熱着させ、もって円筒状の溶融樹脂内管部を形成させることによって、外管部の外面に螺旋状ではなく、環状の山部および谷部を軸方向に交互に備え、他の構成は上述の例と略同様の合成樹脂製コルゲートパイプ（二重管）を得ることができる（詳細は特公平2-21477号公報参照）。そのほか、内管部をチューブ状に押し出した後、補強部材を巻き付けて二重管とすることもできる。

【0012】

【発明の実施の形態】以下、図に示す実施の形態に基づいて本発明を説明する。なお、これによって本発明が限定されるものではない。まず図1は、本発明に係る合成樹脂製コルゲートパイプの1つの実施の形態を示す。一部破断正面図、図2は図1の要部拡大断面図である。

【0013】図1～2において、上水の輸送用二重管Hは、外面に螺旋状の山部1aおよび谷部1bを軸方向に

交互に連続的に備えた補強部材としての外管1と、この外管の谷部1bの内面で一体に接合された管本体としての円筒状内管2とからなり、外管1が高密度または中密度ポリエチレン樹脂で、内管2がポリオレフィン系熱可塑性エラストマーでそれぞれ形成されている。

【0014】かくして、輸送用二重管Hは、土中やジョイントボックス内で屈曲状態に配置されても、外管1を高密度または中密度ポリエチレン樹脂で、内管2をポリオレフィン系熱可塑性エラストマーで形成していることで、内管2の内面でのしわの発生を抑えることができると共に座屈強度、引裂強度、耐久性、リサイクル性が良好である。もちろん内管2の材料のポリオレフィン系熱可塑性エラストマーは、スチレン・ブタジェン共重合体やクロロビレンなどのゴム材料のごとく加硫工程を必要とすることもなく、加工が容易である。さらに言えば、スチレン・ブタジェン共重合体、イソプレンゴム、天然ゴムなどのゴム材料に比して耐水性、耐酸性、耐アルカリ性が良好であり、耐候性も良好である。

【0015】ここで参考までに、輸送用二重管Hの材料・寸法仕様例を挙げる（但し標準長さ寸法：4000mm）。

内管（円筒状管）（ポリオレフィン系のマトリックスにエチレン・プロピレン・ジェン共重合体粒子を微分散させたもの、ショア硬度：60A）

内径：49mm

外径：50mm

外管（高密度ポリエチレン樹脂）

内径（谷部外径）：51mm

外径（山部外径）：60mm

この上記の輸送用二重管Hは、外管部が硬質ポリエチレン樹脂で形成されているが、主としてその山部・谷部を有する構成と材料自体の弾性により、曲率半径約50mmで内管部の内面にしわが生じなかった。

【0016】以上の実施の形態とは異なり、外管を、内管の外側に、螺旋状ではなく、環状に山部および谷部を軸方向に交互に設けることもできる。

【0017】

【発明の効果】本発明に係る合成樹脂製コルゲートパイプによれば、補強部材を硬質熱可塑性樹脂で、管本体の内面を熱可塑性エラストマー又はエチレン系共重合体からなる弾性材料で形成することによって、コルゲートパイプを屈曲させたときに管本体内面にしわが発生しないので、曲がり部での接続具が不要になり施工が簡単になり、かつリサイクル性も良好にする。

【図面の簡単な説明】

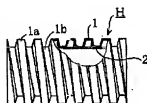
【図1】本発明に係る合成樹脂製コルゲートパイプの1つの実施の形態を示す一部破断正面図である。

【図2】図1の要部拡大断面図である。

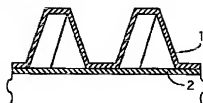
【符号の説明】

- 1 外管
- 1a 山部
- 2 内管
- 2a 谷部
- H 輸送用合成樹脂製二重管

【図1】



【図2】



フロントページの続き

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AK51C AK52C AK68C AK71C  
AL01C AL05C AL09C AN00C  
BA03 BA07 BA10B BA10C  
DA11 DE01C DH00B EJ05C  
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